

## CLAIMS

1. Catalyst based on crystalline aluminosilicates of the pentasil type, characterized by the fact that it is constructed from primary crystallites with an average diameter of at least  $0.01\text{ }\mu\text{m}$  and less than  $0.1\text{ }\mu\text{m}$ , which are combined to at least 20% to agglomerates of 5 to  $500\text{ }\mu\text{m}$ , the primary crystallites or agglomerates being bonded together by finely divided aluminum oxide, that its BET surface is  $300\text{ to }600\text{ m}^2/\text{g}$  and its pore volume (determined according to mercury porosimetry) is  $0.3\text{ to }0.8\text{ cm}^3/\text{g}$ , that it is present in H form, and that the amount of finely divided aluminum oxide binder is 10 to 40 wt.%, referred to the total weight of the aluminosilicate and binder, in which the finely divided aluminum oxide binder is present in the reaction charge as a peptizable aluminum oxide hydrate, in which sodium aluminate is used as aluminum and alkali source and the primary synthesis of the crystalline aluminosilicate occurs without addition of acid.
2. Catalyst according to Claim 1, characterized by the fact that
  - (a) the catalyst, if it is to be used for a method for conversion of methanol to olefins, especially propylene, has an Si/Al atomic ratio of about 50 to 250, preferably about 50 to 150, especially about 75 to 120, or
  - (b) the catalyst, if it is to be used for an olefin to olefin conversion, has an Si/Al atomic ratio between 10 and 100, preferably between about 20 and 65, especially about 20 and 50.
3. Catalyst according to Claim 1 or 2, characterized by the fact that the average diameter of the primary crystallites lies in the range from  $0.01\text{ to }0.06\text{ }\mu\text{m}$ , especially from  $0.015\text{ to }0.05\text{ }\mu\text{m}$ .
4. Catalyst according to one of the preceding claims, characterized by the fact that final calcining is conducted at a temperature between  $500^\circ$  and  $850^\circ\text{C}$  for 1 to 12 hours, preferably from  $660\text{ to }850^\circ\text{C}$  for less than 5 hours, especially  $680^\circ\text{C}$  to  $800^\circ\text{C}$  for 1 to 4 hours.

5. Catalyst according to one of the preceding claims, characterized by the fact that an acid concentration of 0.15 to 2.5 mol H<sup>+</sup>/mol Al<sub>2</sub>O<sub>3</sub>, preferably 0.20 to 1.5 mol H<sup>+</sup>/mol Al<sub>2</sub>O<sub>3</sub>, and especially 0.4 to 1.0 mol H<sup>+</sup>/mol Al<sub>2</sub>O<sub>3</sub>, is set for peptization of the aluminum oxide hydrate.
6. Catalyst according to one of the preceding claims, characterized by the fact that at least 10%, preferably at least 20%, especially at least 60%, of the pores have a diameter from 14 to 80 nm.
7. Catalyst according to one of the preceding claims, characterized by the fact that at least 95% of the particles of the peptizable aluminum oxide hydrate are  $\leq 55 \mu\text{m}$  (referred to average diameter).
8. Catalyst according to one of the preceding claims, characterized by the fact that the finely divided aluminum oxide binder is obtained by hydrolysis of aluminum trialkyls or aluminum alcoholates.
9. Catalyst according to one of the preceding claims, characterized by the fact that is obtained as follows:
  - (a) an alkaline aluminosilicate gel is produced in known fashion in an aqueous reaction charge containing a silicon source, an aluminum source, an alkali source and a template at elevated temperature and optionally elevated pressure, and converted to a crystalline aluminosilicate, but during which the reaction is interrupted when the obtained primary crystallites have an average diameter of at least 0.01  $\mu\text{m}$  and less than 0.1  $\mu\text{m}$ , preferably in the range from 0.01 to 0.06  $\mu\text{m}$ , especially from 0.015 to 0.05  $\mu\text{m}$ ;
  - (b) the primary crystallites are separated from the aqueous reaction medium as preagglomerates, dried and subjected to intermediate calcining;

- (c) the product of stage (b) is converted with a proton-containing substance, or one that yields protons when heated, for exchange of the alkali ions in an aqueous medium, separated, dried and subjected again to intermediate calcining, whereupon an agglomerate fraction of about 5 to 500  $\mu\text{m}$  is separated;
- (d) the agglomerate fraction from stage (c) is mixed with the finely divided aluminum oxide hydrate;
- (e) the product from stage (d) is subjected to final calcining.
10. Catalyst according to one of the preceding claims, characterized by the fact that to produce the aluminosilicate gel, the silicon source, the alkali source, the aluminum source, the template and the water from the mother liquors of the previous synthesis are used and made up by the amounts of the invention compounds necessary for synthesis of the aluminosilicate gel.
  11. Catalyst according to one of the preceding claims, characterized by the fact that the template is tetrapropylammonium hydroxide (TPAOH) or tetrapropylammonium bromide (TPABr).
  12. Catalyst according to one of the preceding claims, characterized by the fact that the template is a mixture of ammonia or an organic amine and another organic compound from the group of alcohols, preferably butanol.
  13. Catalyst according to one of the preceding claims, characterized by the fact that the aqueous reaction charge from stage (a) has a pH value from 10 to 13 and formation of the aluminosilicate primary crystallites occurs during agitation at 90 to 190°C, preferably at 90 to 150°C.
  14. Catalyst according to one of the preceding claims, characterized by the fact that the agitation speed is a maximum of 900 rpm.

15. Catalyst according to one of the preceding claims, characterized by the fact that the primary crystallites in stage (b) are separated from the aqueous reaction medium by addition of a flocculent.
16. Catalyst according to one of the preceding claims, characterized by the fact that intermediate calcining in stage (b) is conducted in an inert atmosphere at about 200 to 350°C, preferably about 350°C, and then in an oxidizing atmosphere at about 500 to 600°C, in order to burn off any remaining amount of template still present.
17. Catalyst according to one of the preceding claims, characterized by the fact that intermediate calcining in stage (c) is conducted at 400 to 800°C, preferably about 540°C, over a period from 5 to 20 hours.
18. Method for production of a catalyst according to one of the preceding claims, comprising the process steps a) to e) according to Claim 9.
19. Use of the catalyst according to one of the Claims 1 to 17 in an MTP or OTO process, preferably according to DE 100 27 159 A1 or DE 100 00 889 A1.